A PROGRAM FOR TEACHING PARTNERS OF INDIVIDUALS WHO USE AUGMENTATIVE AND ALTERNATIVE COMMUNICATION: OUTCOMES OF A CASE STUDY WITH A CAREGIVER OF AN ADULT AAC USER

By

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Abstract

A single-subject, exploratory case study design was used to investigate the effects of a partner instruction program, including both an adult augmentative and alternative communication (AAC) user with Rubenstein Taybi Syndrome (RTS) and his caregiver. This study investigated the caregiver's implementation of an instructional protocol to facilitate the following: (a) a six-step conversation; and, (b) comments during small talk (e.g., "That's cool!" or "Oh no!"). The AAC user's success in acquiring the use of these two skills was also measured. There were three phases: Phase 1, instruction in operational skills; Phase 2, instruction in social and linguistic skills; and Phase 3, maintenance and generalization of skills. Caregiver instruction in how to facilitate a six-step conversation resulted in 100% accuracy during instruction and four weeks post-instruction. Caregiver instruction in how to facilitate comments resulted in 100% accuracy during instruction and four weeks post-instruction. The AAC user demonstrated 100% accuracy for a six-step conversation and 80% accuracy for comments during small talk. Four weeks post-instruction, his accuracy levels were at 100%. Generalization to new environments (i.e., the local mall), and with new partners was successful for the participants (i.e., accuracy levels were at 100%). Results suggest that partner instruction is an effective and efficient means of teaching partners how to enhance AAC users' communicative competence.

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Chapter 1: Literature Review

Augmentative and Alternative Communication

More than 3.5 million Americans have communication impairments so severe that their natural speech cannot meet daily communication needs (Beukelman & Mirenda, 2013). Insufficient access to spoken communication restricts these individuals in all aspects of life. An inability to communicate with others severely decreases opportunities to be active participants during conversation. Thus, individuals with complex communication needs are unable to take advantage of opportunities to contribute to their community, family, education, and employment (Beukelman & Mirenda, 2013).

There are, however, options and strategies available to individuals with complex communication needs. Augmentative and alternative communication (AAC) is an option utilized by many individuals when communication needs cannot be met through speech alone (Beukelman & Mirenda, 2013). An AAC system can include anything that helps people more effectively convey a message to their listener.

Individuals may experience limitations to their speech. Fortunately, language and communication are not limited to speech. Written language and signed language are valid alternatives, augmented with vocalizations, facial expressions, or gestures. AAC systems, such as a text-to-voice software, couple the users' spoken, written, or signed language skills with features that enable them to successfully communicate in real time (Hong, Ganz, Gilliland, & Ninci, 2014).

There are two types of AAC systems: unaided and aided. Unaided AAC requires users to simply use their body for communication (i.e., gestures, vocalizations, spoken language, or sign language). Aided systems require individuals to have an additional item

or “tool” to supplement communication. The tools may be as simple as a pen and paper or as technologically advanced as an iPad or computer-based system that allows users to activate the keyboard with eye gaze. AAC includes tools that are readily available, such as real objects, photographs, or line drawings, and tools that continue to improve with advances in technology, such as synthesized speech and digitized speech (Light, 1989).

In addition to unaided and aided systems, AAC can be categorized as light tech or high tech. Light tech systems feature static displays in which the visual stimuli is unchanging (e.g., a communication book, communication wallet, alphabet board). High tech systems contain dynamic or changing displays that produce voice output and visual output (e.g., an iPad, laptop computer). Each system offers its own benefits based on personal communication needs.

AAC System Populations

Individuals who need AAC often experience difficulty in their daily interactions (Light, Dattilo, English, Gutierrez, & Hartz, 1992). Although there is no *typical* profile for people who depend on AAC, research by Stoner, Angell, and Bailey (2010) suggests that individuals with complex communication needs benefit from access to conversation using AAC.

People requiring AAC often present with an acquired or congenital disorder (Beukelman & Mirenda, 2013). Common congenital disabilities that lead to severe communication disorders may include: intellectual disability, cerebral palsy, autism, or developmental apraxia of speech (Beukelman & Mirenda, 2013). Use of AAC is also commonly seen by individuals with the following acquired impairments: amyotrophic

lateral sclerosis, multiple sclerosis, traumatic brain injury, stroke, or spinal cord injury (Beukelman & Mirenda, 2013).

Rubinstein Taybi Syndrome

In 1963, Rubinstein and Taybi described seven children with intellectual disabilities and distinctive facial features (Berry, 1987). In 1964, Coffin confirmed Rubinstein and Taybi's discovery through his identification of six additional children with strikingly similar anomalies (Berry, 1987). The disorder was named Rubinstein Taybi Syndrome (RTS) in honor of Rubinstein and Taybi's research.

RTS is a rare disorder identified in approximately 1 in 100,000 infants at birth (Hennekam, 2006). The distinctive features that Rubinstein and Taybi noted include highly arched and long eyebrows, long eyelashes, a beaked nose, a broad nasal bridge, and micrognathia (i.e., underdeveloped lower jaw). Individuals with RTS may also exhibit broad thumbs, broad big toes, and general broadening of the hands and fingers (Hennekam, 2006). A short stature usually accompanies these physical features. Additional physical anomalies may include a variety of congenital heart defects or eye anomalies (e.g., ptosis, drooping of the eyelid, or congenital glaucoma (Hennekam, 2006).

Globally, patients with RTS present with an intellectual disability, with an IQ ranging from 30 to 80 (Berry, 1987; Hennekam, 2006). It should be noted, however, that patients may have the capacity for cognitive functioning above this range. In Hennekam's (2006) study, he noted that patients have an "uncanny ability" to demonstrate social skills and develop social relationships. Limited attention span, mood changes during early adulthood, and decreased ability to coordinate body movements are also associated with

RTS, in addition to increased risk for cancers such as brain tumors and leukemia (Hennekam, 2006).

RTS is caused by gene mutations of the CREBBP in approximately 50-70% of cases (Stevens, Pouncey, & Knowles, 2011). Mutations of the EP300 gene cause approximately 3% of cases (Stevens et al., 2011). Etiology for approximately 30% of cases is still unidentified (Stevens et al., 2011).

Light's Communicative Competence

In 1989, Light defined communicative competence as it applies to individuals with complex communication needs, a dynamic concept. To be competent, individuals must demonstrate adequacy, functionality, and sufficiency during conversation. There are four interrelated areas of competency as described by Light (1989): operational competence, social competence, linguistic competence, and strategic competence. AAC users, as well as caregivers, benefit from knowledge and instruction to develop skills in each area (Light & McNaughton, 2014).

Operational competence. This area is comprised of skills associated with the technological aspects of an AAC system, from learning how to turn the system on and off, to programming new vocabulary. As per Light (1989), it is critical that AAC users and caregivers: keep vocabulary on the system up to date, construct displays and overlays when needed, protect the system from possible damage or breakage, secure repairs as needed, modify the system for the future, and ensure that the system is available for daily use. Infrequently, caregivers or other facilitators receive instruction in AAC; this is appropriate when the users' motor or cognitive skills are limited by age or disability.

Caregivers who are taught how to program new words and phrases may facilitate vocabulary growth and prevent system abandonment (Stoner, Angell, & Bailey, 2010).

Social competence. This area encompasses the knowledge and skills related to the social interactions in which AAC users participate. These may include initiating, maintaining, developing, or terminating conversations with familiar or unfamiliar partners (Light, 1989). In essence, social competence requires AAC users to have a basic understanding of conversational pragmatic skills, particularly, appropriately timed turn-taking. The individual with AAC needs must take time to listen to communication partners and learn how to time programmed answers effectively. An understanding of knowing when to request information, as opposed to when to provide information, is also part of social competence. Because individuals who use AAC systems often face barriers to forming close social relationships with others, instruction in social skills is essential (Light & McNaughton, 2014).

Light (1997) explained that most conversations have a predictable structure. The majority of conversations begin with a greeting, followed by small talk. Depending on the length and depth of the conversation, information sharing often follows small talk, as well as closing the conversation with a wrap up and farewell remark. When programming an AAC system, it is important for clinicians and caregivers facilitating conversations to acknowledge the natural progression within a communicative exchange (Beukelman & Mirenda, 2013)

Greetings. According to Beukelman and Mirenda (2013), expanding greetings is essential to helping individuals initiate social interactions. A greeting communicates friendly intentions while also announcing each speaker's presence (Light, 1997).

Although greetings appear quite simple, it is important to recognize scenarios when formal greetings are more appropriate than informal greetings. For example, young children may need to use a more formal greeting with school teachers than with peers.

Small talk. Following the greeting, small talk is often exchanged (Light, 1997). Small talk allows individuals to maintain a conversational interaction. One type of small talk that is often effective for AAC users is generic small talk (Beukelman & Mirenda, 2013). Generic small talk does not require the use of specific details and can be used with any type of communication partner (Beukelman & Mirenda, 2013). Some examples of generic small talk are as follows: "How are you?," "What's happening?," "She's great!" (Light, 1997). Beukelman and Mirenda (2013) suggest that AAC users should have access to a selection of different small talk options.

Some conversations do not progress past small talk (Beukelman & Mirenda, 2013). In other conversations, small talk is a useful transitional phase where communication partners shift from the greeting to sharing information or short stories. According to Beukelman and Mirenda (2013), small talk is most useful in conversations with unfamiliar partners.

Information sharing. People use information sharing as a way to establish social closeness. Social bonds and friendships may be established through personal stories or procedural descriptions (e.g., providing someone with directions).

When AAC users share information or stories with a communication partner, their success often depends largely upon their caregivers (Beukelman & Mirenda, 2013; Light, 1997). Sharing information or stories is specific and personal, thus caregivers must program appropriate vocabulary. Opportunities for personal, meaningful conversation

should be facilitated by caregivers to allow AAC users to build social closeness during conversation, prior to reaching wrap up remarks (Beukelman & Mirenda, 2013).

Wrap up and farewell. A wrap up is often used to indicate intent to end a conversation. Wrap up remarks typically contain more information than farewell statements. Phrases such as "The kids need me," "I need to get to work now," "Have a nice day," or "I look forward to talking again soon!" can be considered conventional wrap-up remarks (Light, 1997). According to Beukelman and Mirenda (2013), a farewell statement is offered as the final conclusion to the interaction and helps add closure to the conversation. A typical farewell may be one of the following: "See you later," "Good bye," or "Have a nice day."

Linguistic competence. Light and McNaughton (2014) describe linguistic skills as receptive and expressive language skills in the native language of individuals with AAC needs. Light (1989) states that linguistic competence involves AAC users' knowledge and understanding of the AAC system's specific linguistic code. Thus, individuals who use AAC must learn the language code of their system while also acquiring knowledge in representational aspects of AAC symbols (Light & McNaughton, 2014). For some AAC users, this may include memorizing the symbols and pictures associated with different vocabulary programmed onto the system. Depending on native language proficiency and knowledge, this may also include connecting pictures or symbols to written words or phrases (Beukelman & Mirenda, 2013).

Caregivers and facilitators play a major role in aiding individuals who use AAC to master linguistic competence. Ongoing opportunities for practice with the system's code should be provided by caregivers or facilitators. Beukelman and Mirenda (2013)

explain that caregivers and facilitators require instruction to learn the applicable symbols and code. Caregiver instruction in linguistic competence often benefits AAC users by providing caregivers with the knowledge to teach users system vocabulary. Light and McNaughton (2014) propose that additional practice of the augmentative system symbols or code in the home, with caregivers, will increase users' proficiency with their systems.

Strategic competence. Strategic competence involves the knowledge and skills to use strategies to compensate for limitations associated with AAC use. According to Light (1989), AAC users will inevitably face limitations in social or linguistic competence due to their significant disabilities, system restrictions, and environmental restrictions caused by society. Compensatory strategies used to overcome obstacles caused by these restrictions fall under strategic competence. Beukelman and Mirenda (2013) explain that strategies may include interacting with conversational partners unfamiliar with AAC or compensating for breakdowns in communication. Instruction in strategic competence provides AAC users and caregivers with strategies that may help when breakdowns occur (Light, 1989). For example, caregivers and AAC users may learn to use a message such as "Please slow down and wait for me to finish" (Light & McNaughton, 2014). Similarly, caregivers and AAC users may learn to use a gesture that means "No" or "Please wait" (Light & McNaughton, 2014).

The Importance of Caregiver Instruction

Instruction in AAC typically focuses on individuals using the AAC system, with little attention given to caregivers or facilitators of AAC users (Stoner, Angell, & Bailey, 2010). Research suggests that educating caregivers is an essential component of AAC users' success (Kent-Walsh & Mcnaughton, 2005). Several authors (i.e., Beukelman &

Mirenda, 2013; Kent-Walsh & Mcnaughton, 2005; Light et al., 1992), have argued that in order for AAC users to fully benefit from interventions, therapy and instruction must be dual-pronged. That is, intervention should involve direct instruction with the caregivers or facilitators, as well as the AAC users. A study by Kent-Walsh and McNaughton (2005) demonstrates that AAC instruction for caregivers is vital for success because caregiver knowledge must exceed that which is needed to have a conversation with individuals who do not use AAC.

For instance, caregivers must learn how to operate the technological aspects of the system, understand and learn the system's symbol code, learn how to provide instruction and practice opportunities for AAC users, and recognize when and how to compensate for communication breakdowns. Essentially, caregivers must master Light's (1989) aforementioned areas of competency: operational, social, strategic, and linguistic (Beukelman & Mirenda, 2013). Once caregivers become fully competent with the AAC system, growth and continued usage for AAC users can be facilitated.

For example, Stoner et al. (2010) reported that in a case study with a young adult AAC user, the most significant barrier between the AAC user and his proficiency with his system was related to the lack of instruction provided to facilitators. Stoner et al. (2010) further explained that although individuals with AAC needs may have particular strengths (e.g., strong social skills, motivation to communicate), special educators, facilitators, or caregivers are necessary to identify barriers associated with the use of the system (e.g., issues with volume control, communication breakdowns). Furthermore, AAC users' advocates need to learn to recognize and respond to barriers presented in order for AAC users to have successful communication interactions (Stoner et al., 2010).

Beukelman and Mirenda (2013) propose that the lack of caregiver follow-through may place limitations on AAC users' success. A failure to instruct caregivers will result in a lack of carry-over of the AAC user's skills. Such failure can be prevented by teaching facilitators the requisite skills (Beukelman & Mirenda, 2013)

In fact, caregiver instruction that targets specific skills relative to improvement of communicative competence may prevent system abandonment (Stoner et al., 2010). Research has demonstrated that instruction with caregivers, as well as AAC users, may produce positive outcomes, resulting in increased vocabulary growth and communicative competence for AAC users (Kent-Walsh, Binger, & Hasham, 2010).

Research Objectives

This case study investigated the development and implementation of a program designed to teach partners (i.e., an adult AAC user and his caregiver), how to effectively participate in conversation. There were five research questions: (1) Will the instructional program result in improvements in the caregiver's operational competence?; (2) Will the caregiver demonstrate and maintain the skills to facilitate: (a) a six-step conversation and (b) comments, with the AAC user during small talk?; (3) Will the caregiver generalize the skills to facilitate: (a) a six-step conversation and (b) comments, with the AAC user during small talk in novel contexts?; (4) Will the AAC user demonstrate and maintain the skills to engage in (a) a six-step conversation and (b) comments during small talk?; and (5) Will the AAC user generalize the skills to engage in (a) a six-step conversation and (b) comments in novel contexts? Finally, given the importance of social validation data, the caregiver will complete a satisfaction survey during instruction and after the completion of the study to determine the value of skills taught to the caregiver.

Chapter 2: Method

Research Design

A single-subject, exploratory, case study design was used to investigate the effects of a partner instruction program. This study occurred from September, 2014 to February, 2015, over the course of 22 weeks. The graduate student clinician met with both participants (i.e., Violet, the caregiver and Blake, the AAC user) on 18 separate occasions for instruction and data collection. The study included multiple probes to document progress in two areas: (a) Violet's use of the instructional protocol for facilitating a six-step conversation and comments in small talk; (b) Blake's performance during a six-step conversation and comments in small talk. Collection of probes occurred on a weekly basis with three weeks dedicated to baseline and nine weeks assigned to intervention, followed by a four week break prior to maintenance and generalization probes, collected over a period of three weeks. Single-subject designs with heterogeneous populations, such as AAC populations, allow evaluation for efficacy of interventions because subjects serve as their own controls (Light et al., 1992). Because the study was exploratory in nature, it allowed for the development of multiple research questions (Yin, 2013).

Additionally, the case study design allowed for the research to be conducted in two settings (i.e., a university clinic and the mall; Runeson & Höst, 2009). Case study research requires that data be collected in a planned and consistent manner; therefore, parameters for qualitative and quantitative data collection were carefully defined prior to executing this study (Soto, Yu, & Kelso, 2008). The flexibility of the case study design, however, permitted the researchers to adjust scheduling to unpredictable factors (e.g.,

patient sickness). Quantitative and qualitative data were collected because the goal of the study was to both measure and explore the effect of a caregiver's use of the instructional protocol with an adult AAC user. Information gleaned from this case study may add to existing research about partner instruction in AAC and increase knowledge about implementing effective partner instruction programs.

Participant: Blake

Background. The AAC user in this case study, Blake, was a 35-year-old male with medical diagnoses of Rubenstein Taybi Syndrome (RTS), agenesis of the corpus callosum, an intellectual disability, and stage IV adult non-Hodgkin lymphoma. His primary caregiver was his mother, Violet. Detailed information regarding both participants was obtained during an interview with Violet (see Appendix A for a comprehensive list of interview questions). Violet confirmed that Blake was diagnosed with RTS at the age of four weeks. She said he was born "markedly different" and "everything was just slow." Specifically, Violet explained that Blake had impaired eye gaze, and he often did not look at speakers. Violet stated that one doctor told her that "he would never walk or talk or even know me." In 1981, at the age of 2 years, Blake began receiving early intervention services from Montgomery County Public Schools and the Radford University Speech-Language-Hearing Clinic (RUSLHC). Treatment focused on encouraging spoken communication along with introducing some sign language.

Nonverbal testing at about five years suggested Blake's cognitive skills were below average (i.e., IQ of approximately 80). At this time, Blake was placed in public school and labeled as a "vegetable." Violet was informed that he was not eligible for educable classes in a mainstream school system and would need to seek education

elsewhere. Violet enrolled Blake in a local community service board day support program from 2001 until 2006, at which time she became his primary care assistant.

Vision and hearing history. Blake underwent a Visual Evoked Response evaluation in 1983. As per his mother, the test showed decreased function for both eyes because his brain does not receive visual stimulation properly. Currently, Blake wears glasses, as he is nearsighted in one eye and farsighted in the other. Blake's history also includes recurrent otitis media as a child and placement of pressure equalization (PE) tubes. Per caregiver report, current hearing testing completed at the RUSLHC showed his hearing was within functional limits at the time of testing (i.e., October, 2014).

AAC history. Although Blake had experience with unaided and low tech AAC since he began kindergarten (i.e., basic sign language, gestures, simple picture exchange), he was not introduced to any high tech systems until 2007 (i.e., at the age of 27 years). At this time, Violet had become concerned about Blake's inability to communicate. His communication primarily consisted of gestures or finding a picture in the environment in attempt to convey his message (e.g., he used store flyers as symbolic icons to communicate where he wanted to go).

In 2009, an AAC evaluation was completed at the RUSLHC and Blake's system was determined to be out-of-date. At that time, Blake's AAC system consisted of a voice output system called a *Voice in a Box* made by Frame Technologies. Violet purchased the system from a friend at church and explained that it was homemade, inexpensive, and large. Due to the system's bulky nature, it was primarily only used in the home. Limited to approximately 20 words recorded in a male's voice, the system did not provide much

room for vocabulary growth. Upon completion of Blake's AAC evaluation at RUSLHC, Medicaid funded a Dynavox V.

The Dynavox V was challenging for Violet and Blake. Blake received speech and language therapy at the RUSLHC for instruction and practice using the Dynavox V, however, both Violet and Blake faced barriers that interfered with operational competency. Violet explained that the first system had a defective voice output mechanism. After receiving a second system, Violet worked on programming and personalizing Blake's system for hours until the system crashed and she had to re-program the system's vocabulary. Violet and speech therapists at RUSLHC continued to work with Blake and his Dynavox V until 2011, when he discontinued therapy due to medical complications.

In June, 2013, Blake returned to RUSLHC and received another AAC evaluation; the iPad 4 with Proloquo2Go™ was recommended as the most appropriate system for his current communication needs. His evaluation also suggested the use of a multimodal approach with Blake to increase his variety of communicative intents.

Intervention history. Prior to the current study, the authors began a twelve week intervention program (i.e., January, 2014 to May 2014) using Blake's iPad 4. At that time, the graduate student clinician programmed Blake's Proloquo2Go™ app with appropriate, individualized vocabulary (see Appendix B for a complete list of current system vocabulary). Intervention targeted seven objectives; Blake succeeded in meeting criteria for all objectives.

Blake's first objective, which served as a precursor to his six-step conversation targeted in the current study was as follows: Blake will participate in two sequential

turns with access to four selections with an unfamiliar communication partner, with spoken cueing as needed (i.e., what do you say when you see someone new?) in 4/5 opportunities; the selections were: (a) “Hello, how are you?”; (b) “Good” or “Bad”; and, (c) “See you later” or “Have a nice day”. At that time, Blake met this objective improving his turn-taking and conversational skills. Timing of conversational turns was addressed (i.e., responding promptly and in turn with the listener) as Blake often responded too quickly and spoke before letting his communication partner have a conversational turn. Blake succeeded in listening and waiting for his turn when given a gestural cue (i.e., slowly pointing toward the iPad); gradually the cue was removed, and at the end of therapy, Blake maintained the skill.

The second objective was as follows: Blake will comment on visual stimuli displaying emotions, with cueing (i.e., slowly pointing toward the iPad), as needed, in a structured drill activity (e.g., watching a YouTube video, pictures of people with different emotions) by selecting from the options: (a) “Oh no!”; (b) “That’s cool!”; (c) “I like it”; and, (d) “I don’t like it” with 90% accuracy. Blake succeeded in his use of “Oh no!” and “That’s cool!” in a conversation; however, “I like it” and “I don’t like it” were not addressed due to Blake’s difficulty understanding the stimuli.

The third and fourth objective included improving Blake’s eye contact while taking a conversational turn and establishing a reliable “yes” or “no” response. The last three objectives targeted key skills to help Blake operate his system. These included: (a) turning his iPad on and off; (b) adjusting the volume; and, (c) identifying screen transition buttons (e.g., “exit,” “done”).

Violet was not directly involved in this twelve week intervention program. She did, however, receive some instruction from the graduate student clinician regarding basic iPad skills (i.e., turning the iPad on and off, adjusting the volume, taking a picture, and accessing email or the internet). Violet was also provided with brief instructions regarding how to program vocabulary using Proloquo2Go™. The graduate student clinician demonstrated how to add new vocabulary to Blake's app by creating new buttons, adding new folders, and then customizing the buttons or folders with different colors and pictures. Violet did not master operational competence skills for Proloquo2Go™; however, the brief instruction allowed her to continue to add vocabulary to Blake's iPad in the summer following the twelve week intervention.

Current communication skills. According to Violet, Blake's preferred way to communicate is with conventional gestures. At home, Blake uses his iPad, signed word approximations, vocalizations, and gestures to convey his message to Violet. Violet reported that Blake had shoe boxes full of pictures, and if he wished to see a certain person, he brought her a picture. When asked if Blake used any spoken communication at home Violet stated, "He used to occasionally, but I don't know if he has given up." Violet reported Blake's use of speech approximations for the words "no" and "mommy" as a child. According to Violet, Blake's motivation seems most apparent when he is at church or at the RUSLHC. At church, she described him as "out of control" because he is "so excited, he uses some signs, gestures, and body language" to socialize (e.g., hugging, smiling, and a thumbs up gesture).

Violet reported that Blake occasionally shows some frustration when he attempts to communicate. "If he wants to do an activity and I can't figure it out, he will shake his

head, sigh, and stomp his feet." Violet described his social skills as enthusiastic but not always appropriate. In the interview, she stated that he sometimes becomes "too eager and bolts for people." Violet said she uses spoken cues when necessary and explained that Blake has learned not to hug anyone he does not know. Furthermore, Violet described Blake's attitude toward his current communication system as follows: "He usually gets very excited about his iPad. We work with it every day." She explained that his iPad is primarily used at home and in therapy; however, they have used the system in other instances (i.e., at Panera bread with their social worker), and hope to use it outside the home more in the future.

Participant: Violet

Violet has been Blake's paid, primary care assistant since 2006. Violet has two other children, a son and daughter, neither of whom live at home. Violet reported that her eldest son did not speak until the age of three and grew up with a learning disability. As a child, he also received speech and language therapy at the RUSLHC; although he still has minor difficulties with reading and writing, he progressed in therapy and reduced his impairments. Additionally, Violet's granddaughter was born with L-Dos De Lang Syndrome; this disorder affects physical and intellectual development.

Violet reported that for fifteen years of Blake's childhood, she was married; however, Blake's father was not very involved in Blake's life growing up. He was employed full time as a letter carrier and spent a majority of his time working. His father still lives in the area and visits Blake occasionally, but his interactions remain limited. Violet remains a strong advocate for Blake and his communication needs. She explained

that Blake is easily understood by his brother and sister; both children were very helpful with raising Blake.

Violet described her relationship with Blake as "great, we are together 24/7." Her goals for Blake include continuous use and work with his iPad 4 and Proloquo2Go™. She stated that she simply wants Blake "to be happy." Violet explained that their future is somewhat "up in the air" and their plans depend on "the stage of his cancer." She believes continuous work on his communication and continued volunteer work at the hospital will help keep Blake content. Blake and Violet volunteer twice a week at a local hospital. Blake's responsibilities include selling candy to patients and staff members while his mother handles the money. He also straightens magazine racks at the hospital gift shop. Violet noted in her interview that Blake has great social skills and loves talking to people. "He's very social and he hates to stay at home!" Violet said that Blake loves going shopping or out to a restaurant: "even though he can't eat, he gets a to-go drink and he loves it. He loves that social atmosphere."

Intervention Staff

All sessions and probes were led by the primary researcher (a graduate student clinician) and supervised by Dr. Diane Millar, an ASHA-certified speech-language pathologist with research and clinical expertise in AAC**.** The graduate student clinician served as Blake's clinician for the twelve week intervention program at the RUSLHC prior to this case study. Given the high level of motivation of Blake's mother to be instructed in using Blake's AAC system and the previous lack of success with AAC, the unique opportunity to document the creation and implementation of a partner instruction program was proposed and accepted by the family.

Setting

This case study was conducted in two settings: (1) Radford University Speech-Language-Hearing Clinic (RUSLHC) and (2) the local mall. The RUSLHC is located in southwestern Virginia and provides services to toddlers through geriatric clients from areas such as Radford, Blacksburg, and Roanoke. All services in the clinic are provided by graduate student clinicians under the supervision of speech-language pathologists certified by the American Speech-Language-Hearing Association (ASHA) and licensed in the state of Virginia.

Materials

An iPad4 programmed with the software Proloquo2Go™ (AssistiveWare®) was used for this study. Released in 2009, Proloquo2Go™ is an award-winning communication app that is symbol supported and easily accessible for the user. According to AssistiveWare®, the app has given a voice to over 100,000 individuals around the world who are unable to speak. The app was designed to provide a portable and affordable communication option to iPhone, iPod, and iPad users. The user can simply open his or her iPad, click on the Proloquo2Go™ icon, and use the app for communication immediately.

One of the app's main features is the highly customizable options. The app allows the user or a caregiver the ability to modify default vocabulary or create a novel vocabulary design with words and symbols. The app features 14,000 pre-programmed SymbolStix™ symbols or the option for use of personal photos. Proloquo2Go™ also comes equipped with the possibility for backup or sharing of vocabularies between systems so that customized vocabularies are not lost.

Because Violet is Blake's primary caregiver, Proloquo2Go™ was an appropriate system due to its simplicity in programming. Due to prior difficulties with operational competence (i.e., with the Dynavox V), Proloquo2Go™ was recommended because caregivers and AAC users can learn the system in a short amount of time. To run the app, the only materials needed are an iPad and an iTunes account. Blake enjoys using his iPad because it is easily accessible and commonly used in public places by a variety of individuals. Additional materials used in therapy included clinician-made therapy materials (i.e., playing cards constructed from photos of Blake's family members played with rules similar to "Go Fish"), a Bingo game, a deck of cards, and a bag of candy for asking the question "Would you like some candy?"

Procedures for Partner Instruction

The partner instruction program occurred over the course of eighteen weeks with a four week break period between the second and third phase. The entire program lasted twenty-two weeks. Procedures were divided into three phases. Phase 1 (three weeks) was designed to increase Violet's operational competence with respect to programming and operating the system. Phase 2 (nine weeks) focused on increasing both partners' social and linguistic competence, teaching Violet the instructional protocol for facilitating a six-step conversation and comments during small talk. Phase 2 also included administration of the first caregiver satisfaction survey. Phase 3 (six weeks) aimed to measure generalization and maintenance of skills taught in Phase 2 along with collecting social validation data in a final caregiver satisfaction survey.

The first phase of instruction was completed in three weeks. In the first week, Violet completed an operational competence pre-test which assessed her competency in

twenty technological skills. Over the course of weeks two and three, Violet participated in two one-hour sessions targeting how to operate and program vocabulary in Proloquo2Go™ (see Appendix C for instructions addressing operational competence).

The second phase of instruction was completed in nine weeks. During the first week, Violet participated in a one hour long role-play session. The session consisted of possible scenarios in which Violet may cue Blake to participate in a six-step conversation or comments during small talk (see Appendix D and Appendix E for cues taught in role-play with the instructional protocol). The remaining eight weeks of Phase 2 instruction included data collection at the beginning of every intervention session. Of note, Violet began Phase 2 instruction following the collection of the baseline probes, so as not to interfere with baseline data for the probes.

The third phase was completed over the course of six weeks (three weeks for generalization and three weeks for maintenance). Of note, the third phase began after a period of four weeks lapsed following instruction in the second phase. The four week break period was issued so maintenance and generalization probes could be properly administered. The purpose of the third phase was to measure Violet and Blake's maintenance and generalization of skills learned; it included no instruction.

Phase 1: Instruction in operational skills.

Operational skill assessment. Prior to operational skill instruction, Violet completed a pre-test to assess programming and navigating Proloquo2Go™ (see Appendix F for pre-test and post-test measures). Following the twenty-two week case-study period, Violet completed an identical post-test assessment. The assessment was designed to evaluate Violet's acquisition of operational competence, programming and

operating the AAC system. Both the pre-test and post-test were administered orally by the graduate student clinician in a quiet therapy room at the RUSLHC (see Appendix F for pre-test and post-test instructions).

Teaching operational skills. The following operational skills were targeted during Phase 1: turning the iPad on and off, adjusting the volume (i.e., louder and softer), and navigating to Proloquo2Go™. Violet was given visual (i.e., an instructional AssistiveWare® packet), spoken, and gestural instructions (i.e., the clinician modeled how to complete the task first). Simple skills were taught first (e.g., turning the iPad on and off), followed by more complex skills (e.g., navigating to Proloquo2Go™ and adjusting the size of icons). Specific instructions for all skills Violet learned can be found in Appendix C.

Additional operational skills targeted included: how to create a new folder, adjust appearance of a folder, create a new button, and adjust the button's color or appearance. Violet received an instructional packet created by AssistiveWare® that detailed how to complete each assigned task. The steps were also modeled by the graduate student clinician during Phase 1 of instruction.

For the target skill "icon personalization," Violet learned how to take a picture with the iPad or retrieve a picture from the Internet. Instruction then included how to import the image to an icon/folder in Proloquo2Go™. Violet first learned where the camera app icon on the iPad was located. After locating the camera app, Violet practiced taking a few pictures. Violet was taught how to toggle between the front and rear cameras. The final step included instructing Violet how to import the pictures she took into Proloquo2Go™ (see Appendix C for specific instructions given).

Additional target skills learned included customizing the appearance of Proloquo2Go™ (e.g., adjusting the number of columns, swapping buttons, and changing display appearance from grid to list). The graduate student clinician instructed Violet with modeling, spoken cues, and written cues (see Appendix C for instructions). Violet took notes throughout instruction related to operational competence. She continued to use and refer to her notebook in sessions following instruction.

Phase 2: Instruction in social and linguistic skills. Phase 2 was initiated to teach Violet the instructional protocol for facilitating a six-step conversation and comments during small talk. Phase 2 was the lengthiest part of the program and consisted of nine intervention sessions. The same probes administered in baseline were re-administered in each of the nine intervention sessions to assess Violet's use of the instructional protocol for cueing Blake during a six-step conversation and comments during small talk.

Instructional protocol. The instructional protocol for a six-step conversation and comments was introduced to Violet in Phase 2. The graduate student clinician reviewed the protocol (see Appendix D and E for instructional protocol), and then used role-play activities to simulate conversational scenarios Violet and Blake may encounter in naturally-occurring situations. The six-step conversation required Blake to take the following turns: (a) "Hello, how are you?" or "What's up?" (Partner: "Good, how are you?"), (b) "Good" or "Bad", (c) "Would you like some candy?" (Partner: "Yes! Thank you."), (d) "You're welcome!", (e) "Have a nice day!" or "See you later.", and (f) "Good bye." If he did not take a turn (i.e., more than three seconds lapsed), Violet was instructed to say "It's your turn!", and if Blake continued with no response (i.e., more than three

seconds lapsed), Violet was instructed to (1) use a hand-over-hand cue and (2) say "It's your turn!" In the event that Blake selected an incorrect item, Violet was instructed to use a hand-over-hand cue and say "It's your turn!"

Approximately three weeks into the instructional program, Violet suggested using the cue, "What do you say?" in place of "It's your turn!" because she felt it was more natural. The protocol was modified to reflect Violet's suggestion. Revisions can be seen in Appendix D and E. When targeting Blake's use of comments during small talk he had access to the following choices on his system: (a) "Oh no!" and (b) "That's cool!" If he did not take a turn (i.e., more than three seconds lapsed), Violet was instructed to say "It's your turn!" and if Blake continued with no response (i.e., more than three seconds lapsed), Violet was instructed to (1) use a hand over hand cue and (2) say "It's your turn!" In the event that Blake selected an incorrect item, Violet was instructed to use a hand-over-hand cue and say "It's your turn!" Identical to instruction for a six-step conversation, spoken cues were modified in week three to reflect Violet's suggestion (i.e., "What do you say?").

Phase 3: Maintenance and generalization.

Maintenance. Maintenance probes consisted of three sessions and were administered four weeks following completion of intervention probes. The graduate student clinician and supervisor met Blake and Violet at the RUSLHC to complete maintenance probes. Procedures followed for administering maintenance probes were identical to those followed in baseline and intervention. While in a structured clinical setting, Blake used Proloquo2Go™ to complete a six-step conversation with five partners (e.g., professors and graduate students). Violet used spoken cues, modeling, and gestures

(i.e., hand-over-hand) when necessary to facilitate the six-step conversation and comments during small talk (see Appendix D and Appendix E for the instructional protocol).

Generalization. Following data collection of maintenance probes, three sessions were dedicated to the collection of generalization probes. Data collection occurred in the local mall where Blake and his mother frequently went on outings. Generalization probes were administered for both a six-step conversation and comments in small talk. Generalization probes differed from baseline, intervention, and maintenance probes in the following ways: (a) the activity for Blake's comments objective changed (i.e., playing Memory Matches, by Lumate, LLC with a partner was utilized); (b) probes were administered in the local mall with unfamiliar partners; (c) Blake's six-step conversation differed (i.e., "Would you like some candy?" was replaced with "Where is Belk?"); and (d) Blake's response "Thank you" was replaced with "You're welcome."

Probes

Throughout baseline, intervention, maintenance, and generalization, probes were administered to measure (a) Violet's use of the instructional protocol for facilitating a six-step conversation and comments in small talk and (b) Blake's participation during a six-step conversation and initiation of comments. The same probes administered in baseline were re-administered in intervention, maintenance, and generalization.

Six-step conversation. To assess participation in a six-step conversation, Blake and Violet were instructed to find five communication partners to engage in conversation. Responses were considered correct if Violet aided Blake in completing all parts of his

conversation in at least 4/5 opportunities (see Appendix D for a complete script of Blake's six-step conversation).

Comments. To address Blake's use of comments, Blake and Violet participated in a game of Bingo or a modified version of Go Fish (i.e., the graduate student clinician created "Go Fish" cards with pictures of Blake's family members). Two additional graduate student clinicians participated to provide more players and communication partners for Blake and Violet. During Bingo, the graduate student clinician spun the Bingo wheel and called out the corresponding number and letter. The Bingo number was also placed in front of Blake as a visual aid for finding a match.

Violet helped Blake discriminate letters and numbers, find a match, and choose whether to respond "That's cool!" or "Oh no!" Responses were considered correct if Blake commented "That's cool!" when a player received a match, or "Oh no!" when a player did not receive a match, in 4/5 opportunities. Caregiver responses were considered correct if cues from the instructional protocol were used to help Blake meet his objective (see Appendix E for an instructional protocol for comments). Cues used in the order of the instructional protocol (e.g., spoken cues, hand-over-hand gesture) were considered acceptable and recorded as correct.

Of note, the Bingo game and Go Fish were replaced with the app Memory Matches, by Lumate, LLC during administration of generalization probes. This app consists of a 4X4 grid matching game. The app allows players to challenge each other during multi player mode or race against a clock during single player mode. For each generalization probe, multi-player mode was used, and Blake played against the graduate student clinician. The cards featured a randomized mix of animals, people, and everyday

objects (e.g., a tree, a ballerina, a ball, a bird). Blake had access to the selections “That’s cool!” and “Oh no!” while playing the game.

Reliability

Several steps were taken to ensure that all probes were administered correctly and consistently. First degree data collection methods were applied and allowed the graduate student clinician to be in direct contact with Violet and Blake while recording data (Runeson & Host, 2009). Data collection occurred in real time; however, all probes for baseline, intervention, and maintenance were video recorded to allow the graduate student clinician and supervisor to double check data. Generalization probes were not video recorded due to the setting where the probes took place (i.e., local mall).

Inter-rater reliability was calculated for all probes including a minimum, accepted criterion of 20% for all baseline, intervention, maintenance, and generalization sessions (Gwet, 2010). A total of 78% (i.e., 14 of 18) of the probes administered were simultaneously recorded by the supervisor. Agreement data were computed by the graduate student clinician and supervisor on a point-by-point system. If the same response (i.e., “+” or “-”) was recorded by both observers for a given trial, the data was considered in agreement. Observer agreement was 98% for each probe.

Chapter 3: Results

Operational Skills Pre-test and Post-test

The pre-test and post-test data for operational skills showed improvement in Violet's ability to navigate Proloquo2Go™ and iPad. Specifically, Violet was tested on 20 skills during the first week of Phase 1 instruction (see Appendix F for pre-test and post-test questions). Violet then received two weeks of training in operational competence skills. Following the completion of Phase 3 (i.e., 19 weeks later), Violet completed a post-test to assess maintenance of operational skills learned. Results are as follows: pre-test data indicated success on less than half, or 45% (9/20) of the operational skills tested; post-test data indicated success on 80% (16/20) of the operational skills tested. Figure 1 illustrates the results.

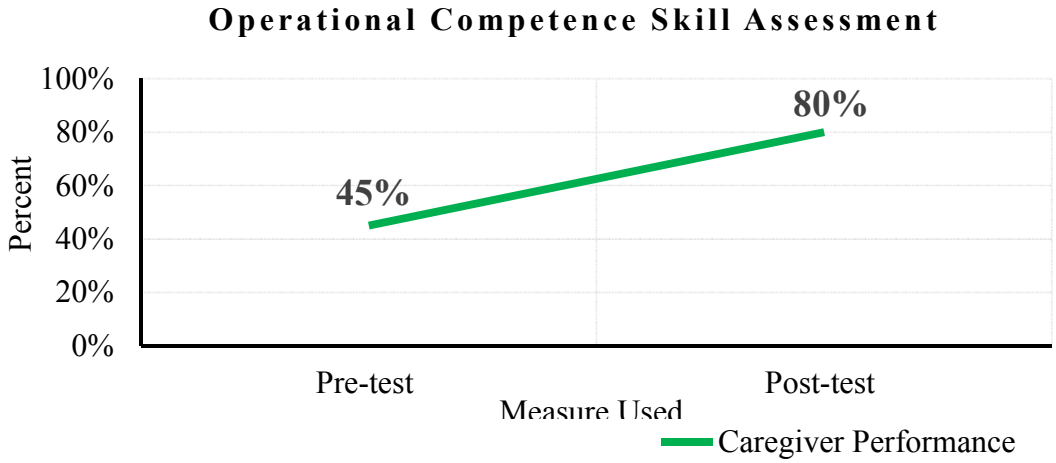


Figure 1. Operational Competence Skill Assessment

Objective Measures

Probes administered during the baseline, intervention, maintenance, and generalization phases are presented below for the caregiver, Violet, and the AAC user, Blake. See Figures 2 through 5. Figure 2 and Figure 3 illustrate Violet's performance

throughout the partner instruction program. Figures 3 and 4 illustrate Blake's achievements for his use of a six-step conversation and comments during small talk.

Violet's instruction for a six-step conversation. During baseline sessions, in which no feedback or instruction was provided by the graduate student clinician, the caregiver demonstrated no improvement in her facilitation of a six-step conversation. After participating in her first instructional session, Violet demonstrated improvement in her performance.

The criterion of 80% is represented on each figure by a yellow line. After the fourth session of intervention, Violet reached and exceeded this level of acceptable performance, achieving 100%. Violet maintained 100% accuracy on the maintenance and generalization probes as well. The skills she acquired during intervention remained

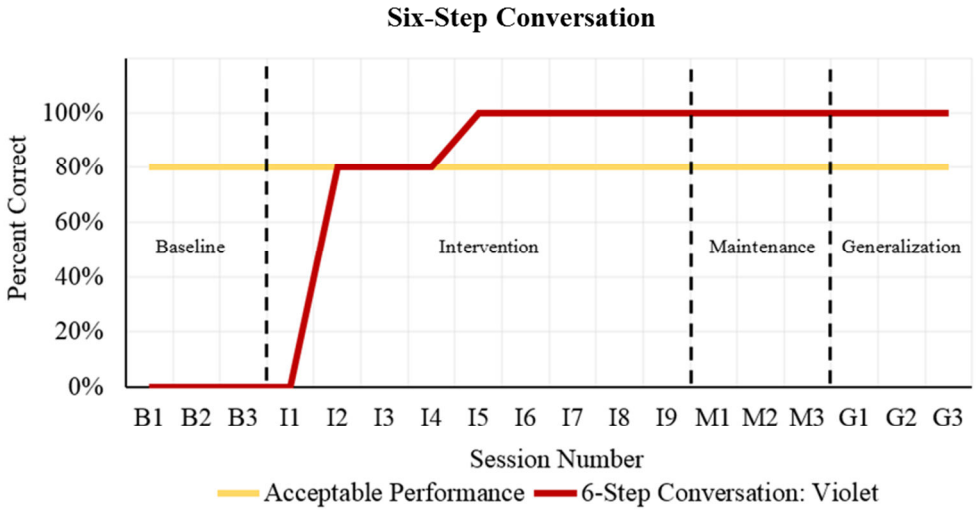


Figure 2. Six-Step Conversation—Violet

strong and transferred to a natural environment at the local mall approximately four weeks after intervention.

Violet's instruction for comments in small talk. Violet showed no improvement of her skills during baseline probes. Her skills in facilitating comments in small talk improved markedly following instruction. Figure 3 shows an improvement to 60% accuracy for the first two intervention probes, followed by a steady increase to 100% accuracy by the fourth intervention probe. Only on the fifth intervention probe and first maintenance probe did Violet's accuracy decrease to 80%, still meeting the criterion indicated by the yellow line.

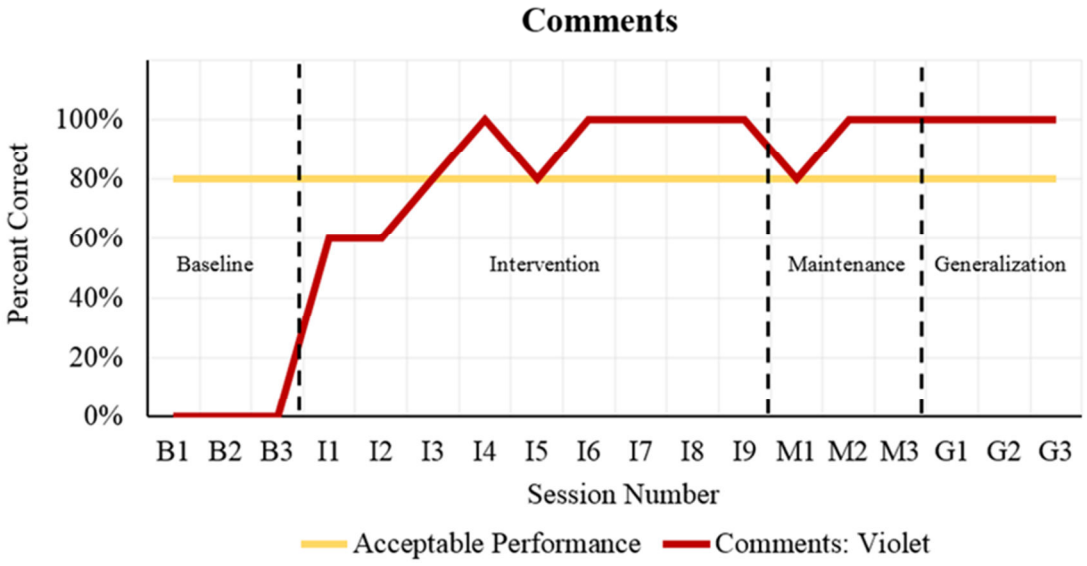


Figure 3. Comments—Violet

Blake's use of a six-step conversation. Blake's gradual skill development in the use of a six-step conversation with unfamiliar communication partners is reflected in the data reported in Figure 4. Blake did not show improved performance on the first intervention probe; however, he made steady progress and performed with 80% accuracy by the third intervention probe. He then exceeded expectations by reaching 100% accuracy on the sixth intervention probe. Blake performed with 100% accuracy

throughout the maintenance and generalization probes, as well, showing his ability to use his six-step conversation with a communication partner after a period of four weeks without instruction.

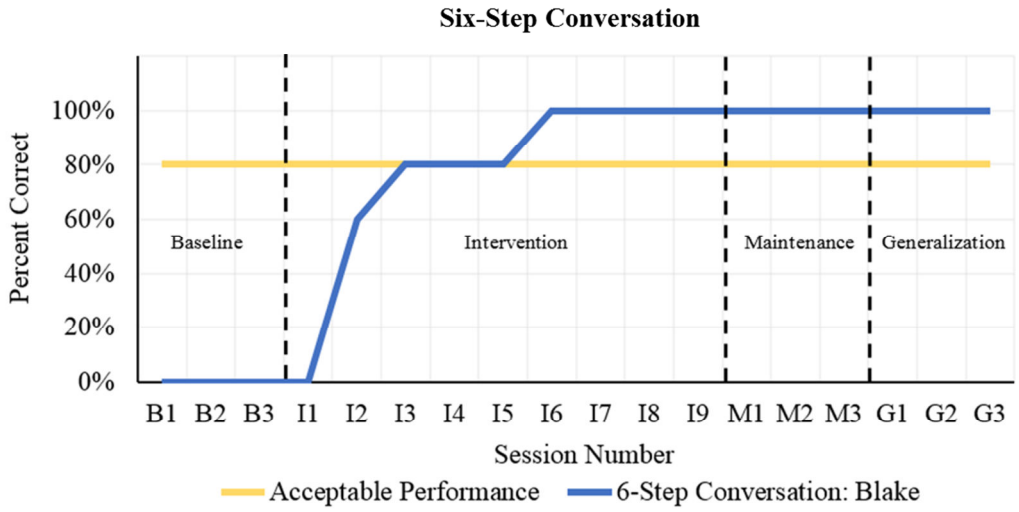


Figure 4. Six-Step Conversation—Blake

Blake's use of comments in small talk. Similar to his performance in a six-step conversation, Blake performed with 0% accuracy at baseline for comments in small talk. With instruction and practice during the intervention phase, Blake showed rapid improvement from an accuracy of 60% to 80%, and later, to 100%. Although Blake's performance dropped twice from 100% to 80% accuracy during intervention, he consistently achieved 100% accuracy on three maintenance and three generalization probes. By the end of the eighteen week instruction period Blake had successfully mastered his objectives. He demonstrated the ability to comment using "That's cool!" or "Oh no!" during various structured therapy interactions (i.e., Bingo and Family Go Fish) Blake also demonstrated that his skills generalized to a second context (i.e., the mall) with a different game (i.e., Memory Matches).

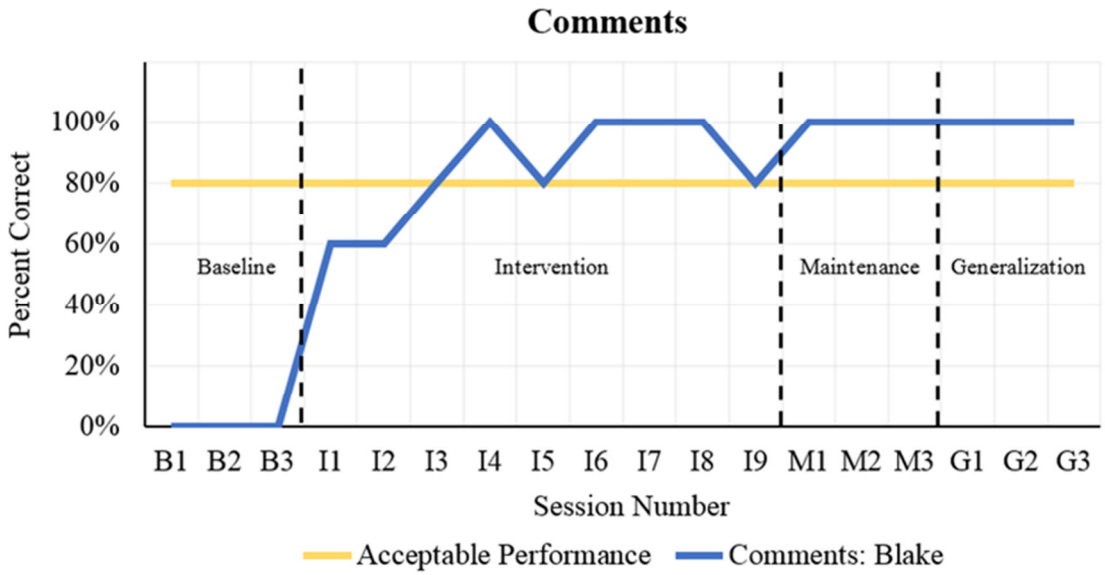


Figure 5. Comments—Blake

Satisfaction Survey

A satisfaction survey was presented to Violet after the third session of intervention and again after the final generalization session of the partner instruction program (see Appendix G for a comprehensive list of survey questions). The satisfaction survey measured Violet's satisfaction with instruction targeting operational skills as well as Blake's use of a six-step conversation and comments in small talk. Violet rated each instructional session or key skill on a five-point scale and was encouraged to leave comments. Table 1 highlights selected comments from the final satisfaction survey.

Table 1. Satisfaction Survey Results

Survey Question	**Comment**
Effectiveness of one-on-one instruction	*An iPad is different from my laptop and computer, the one-on-one instruction has been very valuable. Proloquo2Go™ has been a challenge for me also.*
Importance of teaching caregivers in technological aspects of *Proloquo2Go™*	*Thanks to the instruction I have been able to add phrases for Blake.*
Satisfaction level for programming *Proloquo2Go™* one-on-one sessions	*I would have never figured out how to create a folder or button without these sessions.*
Role-play instruction session and general instruction	*I feel the role-playing instruction has been very helpful for Blake and myself.*
Importance of teaching caregiver skills	*It is very important that I (the caregiver) understand how to program phrases.*
Satisfaction with instruction for learning cueing after role-play session	*I have been Blake's voice for 35 years. I know his gestures better than anyone. It has been necessary for me to learn to cue him rather than answering for him.*
Relevance and usefulness of skills taught in spontaneous conversation	*It was very valuable to have the client and caregiver exposed to various role-playing situations so we could refine the programmed conversations.*
Satisfaction of weekly skills taught in intervention	*It was very useful.*
Satisfaction with sessions conducted at the mall	*Sessions at the mall were very useful, we could fine tune Blake's available responses.*

Chapter 4: Discussion

This case study exemplifies the importance and benefits of providing partner instruction including both the caregiver and the AAC user. Although individuals with complex communication needs face many barriers, the results of this study show it is possible to reach an adequate level of communicative competence in a relatively short amount of time with simple instruction from the caregiver; furthermore, these acquired skills may be maintained and generalized to new contexts (i.e., language, partners, and environment).

Caregiver Instruction

Operational competence. In keeping with Stoner et al. (2010), instructing partners (i.e., AAC users and caregivers or facilitators) in operational skills helps provide caregivers or facilitators with the necessary knowledge to program vocabulary to systems. This instruction facilitates vocabulary growth for AAC users and decreases the likelihood of system abandonment. Light (1989) states that the specific skills caregivers should develop include: keeping vocabulary on the system up to date, constructing displays and overlays when needed, protecting the system from possible damage or breakage, securing repairs as needed, modifying the system for the future, and ensuring that the system is available for daily use.

In keeping with Light's (1989) communicative competence framework, Violet received explicit one-on-one instruction in key technological skills required to operate the iPad and Proloquo2Go™ app.

To address the first research question of this study, (i.e., Will the instructional program result in improvements in the caregiver's operational competence?), the data

support the efficacy of the instructional program designed to improve the caregiver's key operational skills. Violet showed great improvement in her operational skills, from 45% accuracy to 80% accuracy after one-on-one instruction. Approximately halfway through this partner instruction program, Violet began showing the graduate student clinician vocabulary she independently programmed on the system (see Appendix B for vocabulary programmed without assistance), therefore demonstrating generalization of her skills outside of intervention. The clinical implication of these findings is that if a small amount of time, as little as two hours, is dedicated to teaching partners operational competence, these skills may be generalized and maintained over an extended period of time (i.e., as long as twenty-two weeks).

Social and linguistic competence. In keeping with Beukelman and Mirenda (2013), caregivers must invest the time necessary to practice social greetings and conversations with AAC users. This practice leads to efficient interactions and decreased breakdowns, which more effectively builds social closeness between the AAC users and others. Caregivers need instruction to help provide adequate opportunities for practice and facilitate conversations when needed (Beukelman & Mirenda, 2013).

During intervention, Violet learned how to cue Blake in a six-step conversation. The instructional protocol included cues necessary to guide Blake when greeting a communication partner, sharing information with that partner, requesting information, wrapping up the conversation, and using a farewell remark (Light, 1989). Although Blake's social pragmatics were a great strength for him, he lacked the language necessary to develop social competence. Additionally, the graduate student clinician worked closely with Violet to improve Blake's timing with responses. For instance, Blake often initiated

a response before giving his conversational partner a chance to take a turn. As shown in the results, Violet was successful in cueing Blake through the six steps of conversation; she began with an accuracy level of 0% and ended with an accuracy of 100%.

Likewise, intervention improved Violet's ability to cue Blake for appropriate turn-taking skills. She learned to cue Blake to make comments during small talk; her accuracy levels which began at 0%, improved to 100%, and she maintained the ability to facilitate Blake's participation in the six-step conversations.

The maintenance probes support the second research question: Will the caregiver demonstrate and maintain the skills to facilitate (a) a six-step conversation and (b) comments with the AAC user during small talk? In the third phase of the partner instruction program, Violet demonstrated maintenance of her facilitation of a six-step conversation and comments four weeks post-instruction with accuracy levels of 100%.

Violet reported that she continuously practiced vocabulary (i.e., six-step conversation and comments) with Blake, on a daily basis, during intervention and outside of intervention.

> "We practice with Proloquo2Go™ nearly every day. He uses it when I ask where he wants to go or what he wants to do for the day. I have to cue him often to practice with it, but he knows how to use it."

In keeping with Light and McNaughton (2014), caregivers need to provide AAC users with ample opportunities to practice and learn the system's code. After taking the time to learn the symbols and pictures on Proloquo2Go™, Violet reported that she continued to teach the vocabulary to Blake providing him with additional chances to practice.

Furthermore, Violet added new vocabulary (see Appendix B for vocabulary added independently) to the system, which she introduced to Blake and practiced by providing him opportunities for socialization at home.

Data addressing the third research question (i.e., Will the caregiver generalize the skills to facilitate (a) a six-step conversation and (b) comments with the AAC user during small talk in novel contexts?) indicate that Violet generalized her skills to new environments and new partners. She demonstrated skills with 100% accuracy post-instruction for facilitation of a six-step conversation and comments during small talk in a new environment (i.e., the local mall).

Social validation.

Operational competence. Qualitative data was, again, gleaned from the satisfaction survey as a social validation measure (see Appendix G for the complete survey). The satisfaction survey included a rating scale to measure Violet's satisfaction with instruction. Violet was instructed to rate instruction provided on the following rating scale: 1=strongly disagree, 3=neutral, 5=strongly agree, NA=not applicable. Violet chose a rating of five (i.e., strongly agree) for her satisfaction with instruction in all skills except "swapping buttons" and "navigating to the alphabet board." These skills were rated with a satisfaction of 3 (i.e., neutral).

Evidence of the importance of caregiver instruction in operational competence was supported by Violet's comments recorded in the satisfaction survey. In response to "satisfaction level for programming Proloquo2Go™ one-on-one sessions," Violet wrote: "I would have never figured out how to create a folder or button without these sessions."

On the final satisfaction survey Violet also wrote: “It is very important that I understand how to program phrases.”

Social and linguistic competence. The following comment from Violet, recorded on the satisfaction survey, validates the efficacy of the partner instruction, particularly the Phase 2 instruction in social and linguistic competence: “I have been Blake’s voice for 35 years. I know his gestures better than anyone. It has been necessary for me to learn to cue him rather than answering for him.” Violet’s comments further validate the importance of collecting generalization data: “Sessions at the mall were very useful, we could fine tune Blake’s available responses.”

When caregivers demonstrate generalization of skills to novel contexts, this increases the likelihood for AAC users’ vocabulary growth and system maintenance (Stoner et al., 2010). Clinically significant, Violet’s written feedback suggests that caregivers may be both willing and motivated to develop operational, social, and linguistic competence to improve the likelihood of AAC skill maintenance and generalization.

AAC User Instruction

Social and linguistic competence. In keeping with Light (1989), an AAC user must have an understanding of basic pragmatic skills in order to succeed in social competence. Beukelman and Mirenda (2013) explain that caregivers and facilitators play a major role in aiding individuals who use AAC to master linguistic and social competence; however, instruction is necessary to provide caregivers with knowledge to effectively teach. Following instruction, Light and McNaughton (2014) propose that additional practice of the augmentative system symbols and vocabulary will increase

users' proficiency with their system. In agreement with this research, as Violet provided more opportunities for Blake to practice a six-step conversation and comments during small talk, Blake's level of success for each skill increased.

Data collected to answer the fourth research question, Will the AAC user demonstrate and maintain the skills to engage in (a) a six-step conversation and (b) comments during small talk?, show that Blake demonstrated both skills with 100% accuracy while also reaching an accuracy level of 100% four weeks post-instruction. These data suggest that the instruction provided to Violet contributed to maintenance of Blake's skills. The clinical implication is that skills learned by caregivers appear to positively affect the communicative competence and vocabulary growth of AAC.

Data collected to answer the fifth research question, Will the AAC user generalize the skills to engage in (a) a six-step conversation and (b) comments in novel contexts?, shows that generalization to a new environment, with new partners, was successful for Blake (i.e., accuracy was at 100% for a six-step conversation and comments in small talk). Blake demonstrated competency in each learned skill during three separate occasions at the local mall. Blake's success in transferring learned skills to a more natural environment indicates prognosis for future growth in vocabulary and communicative competence. Clinically, when AAC users demonstrate transfer of skills to a natural environment, clinical instruction appears meaningful and functional in the individuals' daily lives.

Limitations and Directions for Future Research

In keeping with Light et al. (1992), in order to have optimally effective therapy, interventions should include caregivers or facilitators as well as AAC users. This case

study exemplifies and provides preliminary evidence for the effectiveness of partner instruction in AAC. The findings suggest the importance of further research on partner instruction programs to maintain and generalize both functional and social AAC skills. One limitation of this case study research design is that data on partner instruction was collected on only one adult AAC user and his caregiver; additional participants are needed for future studies to establish external validity. Second, the AAC user investigated was diagnosed with a rather rare medical condition (i.e., RTS); future research should consider the needs of AAC users with a broad range of disabilities. Third, this study focused on caregiver instruction in two areas: 1) operational competence; 2) facilitation of (a) a six-step conversation and (b) comments during small talk (i.e., linguistic and social competence). Future research should include caregiver instruction in other areas of communicative competence supported by research (e.g., introduction strategies in strategic competence). Fourth, the participants in this study were very close and shared a positive personal relationship. Further research should consider partners unrelated to the AAC user (e.g., paid assistants). Fifth, with respect to research limitations, this study was conducted in two settings only, (i.e. a university clinic and local mall). Research in a different setting (e.g., a school setting), with a different population (e.g., children), is warranted. In closing, the instructional methods described in this case study appear promising for enhancing the communicative competence of AAC users and may provide clinicians with a basis for developing instructional programs for partners of AAC users.

Appendix A: Caregiver Interview Questions

AAC User Background:

1. According to prior reports, Blake has been diagnosed with RTS, agenesis of the corpus callosum, an intellectual disability and stage IV non-Hodgkin lymphoma, is this an accurate diagnosis?
2. Please share more about the process of having Blake diagnosed with RTS and agenesis of the corpus callosum.
3. Can you describe how Blake was diagnosed with an intellectual disability?
4. I know that Blake's diagnosis was a surprise. Can you tell me about that?

Current Communication Skills:

5. Our information indicates that Blake currently uses vocalizations, gestures, and his iPad to communicate, is this correct?
6. Has Blake ever used any spoken communication, for example any words to communicate?
7. What is Blake's preferred way to communicate?
8. When is he most motivated to communicate?
9. Describe when Blake seems to show frustration regarding his ability to communicate?
10. How would you describe Blake's social skills?
11. How would you describe Blake's general attitude toward his current AAC system?

Vision and Hearing History:

12. According to prior reports, Blake underwent visual evoked response testing in 1983. The results indicated that he is nearsighted in one eye and farsighted in the other. How has his vision changed since the testing?
13. Blake recently had a hearing evaluation at Radford University. What were the results of this evaluation?

Speech-Language History

14. Our prior reports indicate that Blake began services in 1981. At that time, what services did he begin receiving? (It is indicated that he received services from Montgomery County Public Schools, Blacksburg County Schools, and Radford University Speech Language Hearing Clinic)
15. According to our prior reports, services were discontinued during middle school around 1990. Could you explain why services were discontinued at this time?
16. Prior reports state that services resumed in 2007 (Blake returned to RUSLHC), due to your concern for his communication. What were your concerns for his communication at that time?

AAC History

17. In 2007, an AAC evaluation was completed, Blake's current system was determined out-of-date. (At the time he had a voice output system made with board maker symbols.) When and where did this system originate?
18. How often did Blake use his voice output system described above?
19. After the AAC evaluation at the RUSLHC was completed, Medicaid funded a Dynavox V for Blake in 2009. What happened after this system was purchased?
20. According to our prior reports, there was a lapse in therapy at the RUSLHC from 2011-2013, did Blake receive any other services at that time?
21. In the June, 2013, Blake received another AAC evaluation which determined that an iPad would be an appropriate AAC system for communication needs. When did Medicaid purchase the iPad? Can you describe the process of securing the system for Blake?
22. In the January, 2014, therapy at RUSLHC began targeting improving Blake's communication with the iPad and individualizing the iPad for his needs. Could you describe Blake's motivation to communicate with the iPad at this time?
23. In January, 2014, therapy began targeting Blake's ability to use greetings and farewells (e.g., "Hello, how are you?" and "See you later"). How useful was this objective for Blake?
24. In January, 2014, therapy also began targeting comments during social settings (e.g., using 'Oh no!' and 'That's cool!' during games or when watching videos). How useful was this goal for Blake?
25. Please explain any progress you feel Blake has made since receiving the iPad and working with Proloquo2Go™.

Generalization

26. How effective is Blake at using his iPad to communicate at home?
27. What other types of communication are used at home? (e.g., gestures, vocalizations, etc.)
28. How often is Blake's iPad used when not at the RUSLHC? Please specify what setting(s) it is used in**.** How effective is he at using his iPad in these settings?

Family History:

29. Is there a family history of speech, language, voice, cognition, or hearing problems?
30. Are there any members of your family now, (in addition to Blake), that have speech, language, voice, cognition, or hearing problems? Please specify.

Caregiver History:

31. Could you describe your educational background? What is your occupational background?
32. How many children do you have?
33. What were your family dynamics like while Blake was growing up?
34. Could you describe your relationship with Blake?
35. What challenges have you faced regarding Blake's communication?

36. What do you hope for Blake to accomplish with his communication in the future?

Appendix B: System Vocabulary

I. Six-Step Conversation:
- a. Hello, how are you?
- b. What's up
- c. My name is Blake*
- d. Bad
- e. Good
- f. Where is Belk?
- g. Would you like some candy?
- h. You're welcome
- i. Thank you
- j. See you later!
- k. Good bye
- l. Have a nice day!
- m. Are you going out to eat?*
- n. Let's do something!*

II. Family and Friends:
- a. I went to see
- b. I want to go see
- c. Blake
- d. Mom
- e. Dad
- f. Cousin Carrie
- g. Cousin Rorie
- h. Aunt Sarah
- i. Mary (sister)
- j. Jacob (brother)
- k. Eva (niece)
- l. Charlie (nephew)
- m. Cadence (niece)
- n. Social workers:
- o. Miss Ashley
- p. Miss Connie
- q. Miss Madison
- r. Graduate student clinician
- s. Supervisor (Dr. Millar)

III. Answers:
- a. Yes
- b. No
- c. I don't know
- d. I'm finished

IV. Places:
- a. I want to go to*
- b. I don't want to go to*
- c. The doctor*
- d. McDonald's*
- e. Kroger
- f. Amelia'
- g. Lewis Gale Hospital*
- h. Carillon Hospital*
- i. Academic Primary Care*
- j. Target
- k. TJ Maxx
- l. Walmart
- m. Family Christian Bookstore*
- n. Michaels
- o. Tuesday Mornings
- p. Barnes and Nobles
- q. Floyd*
- r. Dwelling Place*
- s. Key Largo, FL*
- t. Pigeon Forge, TN*
- u. Gatlinburg, TN*

V. Emotions:
- a. I'm tired
- b. I don't feel well
- c. I'm happy
- d. I'm sad
- e. I'm scared
- f. I'm excited

VI. Comments in Small Talk:
- a. I want to play cards*
- b. I want to play Bingo*
- c. Do you have this card?*
- d. Yes
- e. No
- f. That's cool!
- g. Oh no!
- h. Is it my turn?*
- i. Bingo!*

VII. Hospital:
- a. Hello!*
- b. Would you like some nuts?*

c. Would you like some candy?*
d. You're welcome*
e. Thank you*
f. See you next week*
g. Good bye!*

VIII. Doctors:

a. I don't want to*
b. I want to go see*
c. Dr. Smith*
d. Dr. Harry*
e. Dr. Teal*
f. Dr. Light*

*Indicates vocabulary programmed independently

Appendix C: Phase 1: Instruction in Operational Skills

Target Skill	Instruction Given
1. Turn the iPad on	Locate the iPad's hold button on the top right corner of the system. Press the button until the screen powers on.
2. Turn the iPad off	Locate the hold button, press it until instructions (i.e., "slide to power off") appear on the screen, and follow these instructions.
3. Adjust volume	Locate the volume buttons on the left side of the iPad.
4. Recognize and select the Proloquo2Go™App on the iPad's home screen	Locate the "Home" button, at the bottom of the iPad, on the front. After pressing this button, the Proloquo2Go™ app can be recognized by the owl symbol.
5. Create a new folder	Locate the "Pencil Icon" on the bottom right of the Proloquo2Go™ home screen. Press this button to enter edit mode. Select the button that reads "Add Folder." From "Add Folder" select "New Folder" from drop down menu.
6. Select a color for the folder	Select "Background Color" while in edit mode (see above). Several colors and shades will appear as choices.
7. Select an image for the folder	Type a name for the new folder while in edit mode for "New Folder." Proloquo2Go™ will predict appropriate images for the folder. Images are displayed underneath the preview of the folder, in the upper left corner of the screen.
8. Select an image for a button	See instructions above. Choose "Add Button" instead of "Add Folder."
9. Capture an image	Locate the camera app. Tap the capture button on the bottom of the display screen to take a picture.
10. Toggle between the front and rear camera	Tap the icon in the top right corner of the display screen.
11. Import existing images into Proloquo2Go™	Select the pencil to enter edit mode. Tap the button you wish to edit. A "Picture Options" menu will appear. Tap "Choose a Picture" from the menu. This will allow you to scroll through existing images on the iPad. Choose a desired image.
12. Import images from the internet	Launch the "Safari" app. Find the desired image on an internet search engine. Select desired image my holding your finger on the image until a menu appears. Select "Save" from the menu.
13. Adjust the number of columns	Tap the "Options" button in the bottom, right corner of the display screen (image of two gears). Choose the first tab "Appearance" and then select "Number of Columns."
14. Change the appearance from grid to list	Tap the "Options" button in the bottom, right corner (image of gears). Choose the first tab "Appearance" and then select "Grid to List."

15. “Swap” or change a button’s position	Select the “Edit” menu, indicated by the pencil. To swap buttons first select the buttons you desire to swap, then select the “Swap” button. The buttons will switch places on the screen.

Appendix D: Phase 2: Instructional Protocol and Script—Six-Step Conversation

Six-Step Conversation Script: Baseline, Intervention, Maintenance

Blake: *Hello, how are you?* or *What's up?*

Partner: Good, how are you?

Blake: *Good* or *Bad*

Blake: *Would you like some candy?*

Partner: Yes! Thank you.

Blake: *You're welcome!*

Blake: *Have a nice day!* or *See you later.*

Blake: *Good bye.*

Six-Step Conversation Script: Generalization

Blake: *Hello, how are you?* or *What's up?*

Partner: Good, how are you?

Blake: *Good* or *Bad*

Blake: *Where is Belk?*

Partner: You go straight and turn left.

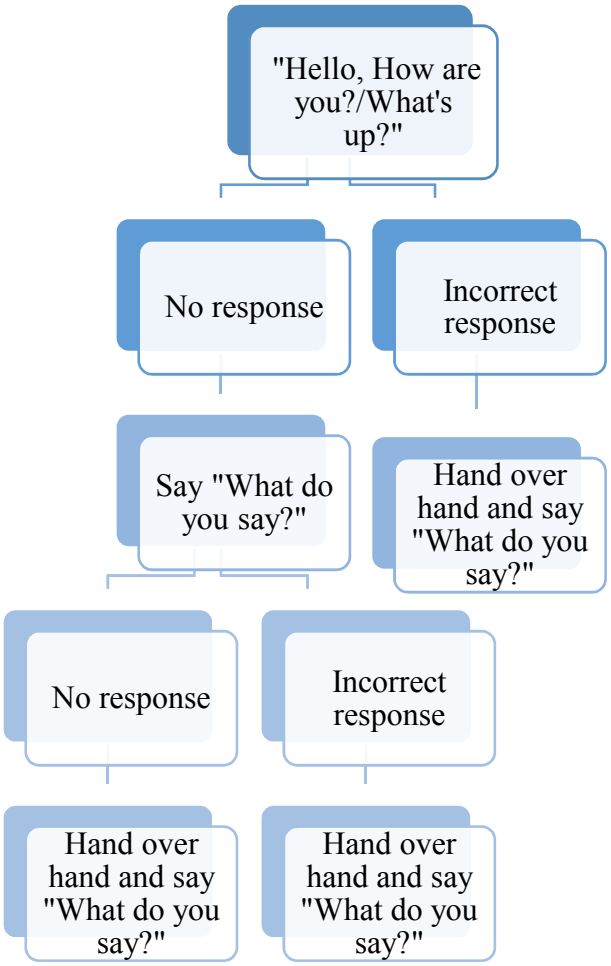
Blake: *Thank you!*

Partner: You're welcome.

Blake: *Have a nice day!* or *See you later.*

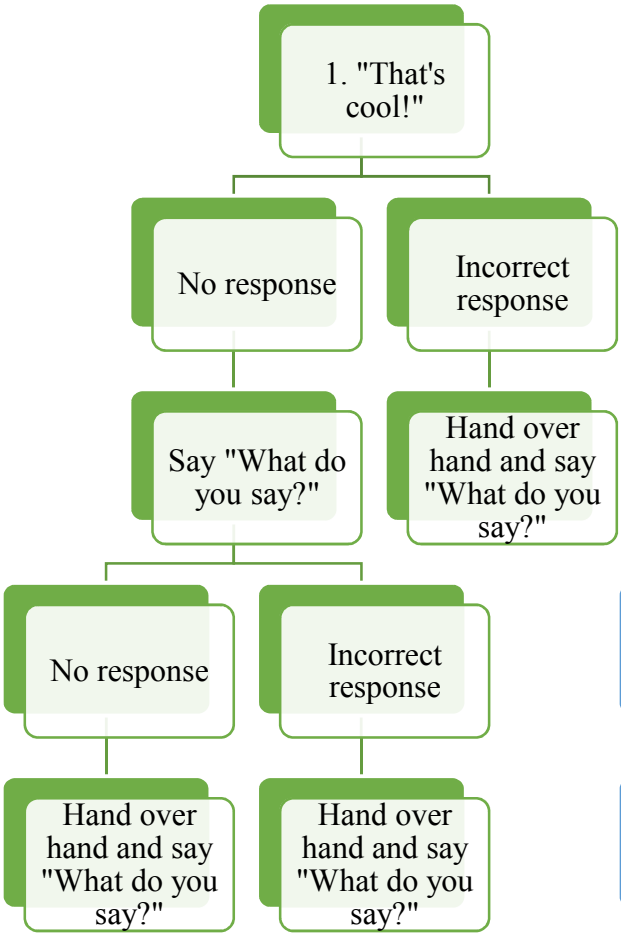
Blake: *Good bye.*

Instructional Protocol

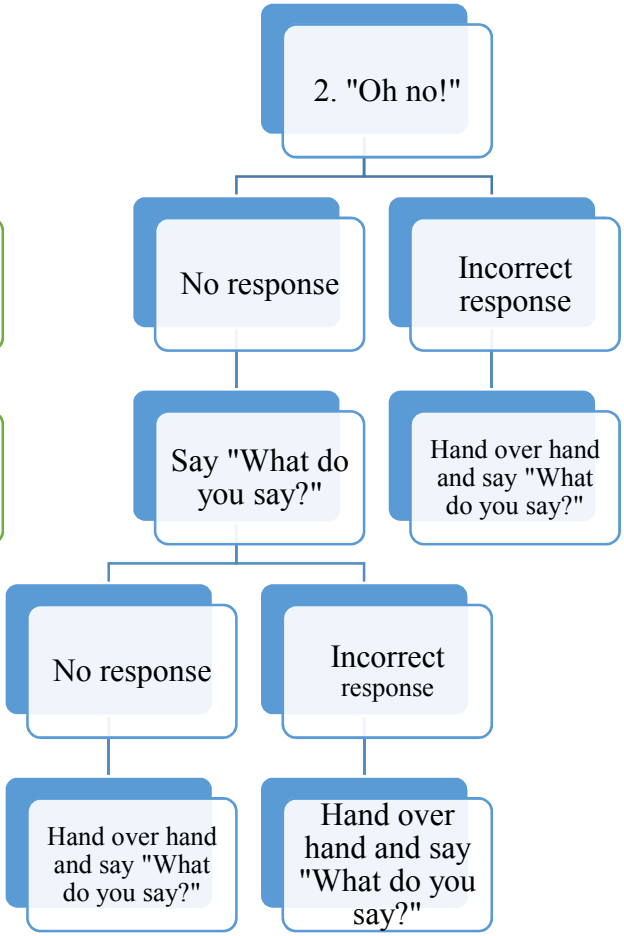


Appendix E: Phase 2 Instruction in Social and Linguistic Skills—Comments

Comments: Choice 1



Comments: Choice 2



Appendix F: Pre-test and Post-test of Operational Skills

This will be given as a handout to follow along and will also be read by the graduate student clinician.

Instructions: During this instructional session, I will be reading directions for you to follow. The session is broken into 20 skills for you to complete. I will only read off of the page; however, if at any time you need me to slow down, repeat a step, or stop, please let me know. Please do not skip ahead of me while I am going over the skills. If, while completing the skill, I see that something is incorrect, I will stop and repeat the steps for you to follow. You will have one hour to complete as many skills as possible.

1. Turn on the iPad and navigate to the Proloquo2Go™ home screen.
2. Check the volume of the iPad.
3. Make a new folder titled "Daily Questions."
4. Make the folder the color red with black font.
5. Go into the new folder:
    a. Inside the folder make an icon that says: "What time is it?"
    b. Choose an appropriate picture for the icon.
    c. Make the icon the color grey.
6. Go into "typing view" and type the message "I need help."
7. Hit "speak" in order to have the iPad speak the message.
8. Create another folder that says "Daily Comments."
9. Choose an appropriate picture for the folder and change the folder so it is green with blue font.
10. Navigate back to Proloquo2Go™ "Home" and find the "Recents View" tab:
    a. Once in "Recents view," press the button that says "Speak the last 15 minutes to recall recent messages."

11. Next, return to the home screen and find the “Options” tab in order to change appearance.
12. You’re currently in a grid style, please change the grid to a list.
13. Change the size of the icons, make them larger.
14. Change the font style to a font of your choice.
15. Return to the Proloquo2Go™ home screen:
    a. Go into “Edit” mode and the “Daily Comments” folder.
        i. Swap the buttons “Oh no!” and “That’s cool!”
16. While in “edit” mode add a sound to the “Comments Folder.”
    a. Add sound #3.
17. Next, navigate to Google and find a picture of a family.
    a. Save the picture.
    b. Edit the folder “Family” and add the picture to the folder.
18. Then, go inside the “Family” folder and copy the icon of “The Professor.”
    a. Paste this icon onto the “Home” screen of Proloquo2Go™.
19. Next, the graduate student clinician will navigate to a transition screen and you will be instructed to navigate away from the screen, finding your way back to the home screen.
20. Finally, change the voice output from a male voice to a female voice.

Appendix G: Satisfaction Survey

Instructions: I am satisfied with the instruction for learning the following skills: Please choose 1, 2, 3, 4, 5, or NA. (1=strongly disagree, 3=neutral, 5=strongly agree, NA=not applicable)

1. Turning iPad on/off	1	2	3	4	5	NA
2. Locating and adjusting the iPad volume	1	2	3	4	5	NA
3. Navigating to Proloquo2Go™ after turning on the iPad	1	2	3	4	5	NA
4. Creating a new folder in Proloquo2Go™	1	2	3	4	5	NA
5. Changing the color of a folder in Proloquo2Go™	1	2	3	4	5	NA
6. Inserting a picture to a folder	1	2	3	4	5	NA
7. Making an icon in Proloquo2Go™	1	2	3	4	5	NA
8. Changing the color of an icon in Prologquo2Go™	1	2	3	4	5	NA
9. Taking a picture with the iPad	1	2	3	4	5	NA
10. Importing a picture onto an icon	1	2	3	4	5	NA
11. Changing the appearance of Proloquo2Go™ from grid to list	1	2	3	4	5	NA
12. Adjusting the size of the icons in Proloquo2Go™	1	2	3	4	5	NA
13. Changing font size and style in Proloquo2Go™	1	2	3	4	5	NA
14. Swapping icons while in Proloquo2Go™	1	2	3	4	5	NA
15. Navigating to the alphabet board and number board in Proloquo2Go™	1	2	3	4	5	NA

Instructions: Please provide feedback on the following: (1=strongly disagree, 3=neutral, 5=strongly agree, NA=Not Applicable)

	1	2	3	4	5	NA
1. Effectiveness of the one-on-one instruction during Phase 1: operational competence						
Comments:						
2. Importance of instruction for caregivers in technological aspects of Proloquo2Go™	1	2	3	4	5	NA
Comments:						
3. Satisfaction level for instruction programming vocabulary onto Proloquo2Go™	1	2	3	4	5	NA
Comments:						
4. Importance of teaching caregivers how to cue/elicit communication from AAC users	1	2	3	4	5	NA
Comments:						
5. Importance of teaching caregivers social competence skills	1	2	3	4	5	NA
Comments:						
6. Satisfaction with instruction for learning cueing after the role-play session	1	2	3	4	5	NA
Comments:						
7. Relevance and usefulness of skills taught in intervention (i.e., cues for a six-step conversation and comments in small talk)	1	2	3	4	5	NA
Comments:						
8. Satisfaction with weekly instruction during intervention	1	2	3	4	5	NA
Comments:						
*9. Satisfaction with sessions at the mall	1	2	3	4	5	NA
Comments:						
*10. Satisfaction with instruction on how to download apps (e.g., games)	1	2	3	4	5	NA
Comments:						

*Indicates questions added to the final satisfaction survey

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